

# How to Organize Your Teaching

## Teaching Strategies

Professional Development  
Module

Montana Office of Public  
Instruction



Preparation:

Introduce yourself and the module.

Say:

Hi, I am \_\_\_\_\_.

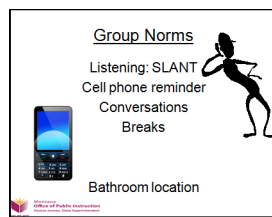
This professional development Module is "How to Organize Your Teaching".

As we work today I will be using a signal to let you know when discussion time is ending and that I need your attention up front.

(Do: Model/practice signal you will use to bring the group back together after small group discussions and activities (ex: count down, hand raise, cue word).

Media: None

Handout: None



Describe SLANT:

**S** = Sit up (good posture keeps you alert)

**L** = Lean forward (this shows interest to your speaker)

**A** = Ask questions (do this by raising your hand, putting the questions in your notes, and to yourself)

**N** = Nod your head (or else shake your head, or show your understanding or confusion in some other way)

**T** = Track your speaker (keep your eye on the speaker to take in important non-verbal clues and to stay alert and interested)

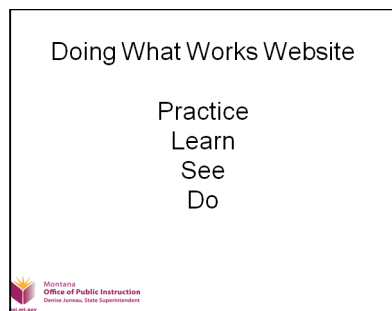
Give a quick reminder to have cell phones on silent mode

Discuss that conversations should be limited to partner or small group discussions as sidebar conversations can be distracting to those around you.

Go over when the scheduled breaks will be and where the restrooms are located.

Media: None

Handout: None



Say: The materials used today will be from the Doing What Works Website as well as Montana Office of Public Instruction. The Doing What Works website follows a sequence that includes:

**PRACTICE SUMMARY:** An overview of the recommended practice

**LEARN:** Learning what works with the given recommendation

**SEE:** an opportunity to see and hear examples of how the recommendation works in actual schools

**DO:** activities that have been designed to support planning and application of the given recommendation



We will follow the same process today as we work together.

Media: None

Handout: None

Introduction Activity

- Think about an adjective that describes you that begins with the same letter your first name begins with and an animal with the same letter as well.
- Share with the group one at a time around the room.
- "Groovy Gloria Groundhog"



Say: Think about an adjective that describes you that begins with the same letter your first name begins with and an animal with the same letter as well.  
Share with the group one at a time around the room.

Give examples: Dedicated Debbie Dog, Gleeful Gwen Goat, Robustful Robyn Rabbit, Slick Shirley Squirrelly

Do: Move quickly around the room and give feedback like nodding and restating adjective names.. (to make the participants feel comfortable)

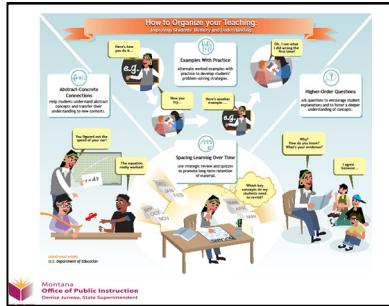
Say: Before we move into our module, you have in your binder an appointment sheet/clock. At times we will be using this to partner for discussions.

You will need to introduce yourself, choose a time to discuss, write your name on your partner's clock and he/she writes his/her name on your clock sheet at the same time. When you are done you will have made 4 appointments.

Please take 3 minutes to get up and make appointments with someone in the room. Try to make an appointment with someone you don't know. Mix it UP.

Handout #1: Appointment Clock

Media: None



*Preparation: Distribute Handout #2*

## How to Organize Your Teaching: Improving Students' Memory and Understanding

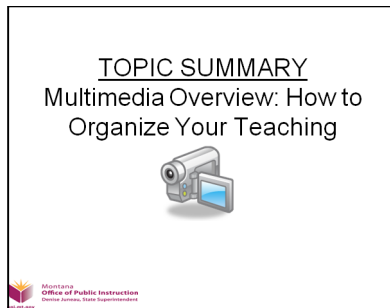
Say:

This visual diagram represents organizing teaching and learning experiences so that students both remember and understand a number of facets.

- Four research-based practices for improving student learning are represented in this diagram.
- The purpose of the diagram is to orient teachers to the topic, provide a visual overview of the practices illustrated on the website, and offer a tool for professional developers.

Media: DWW Visual Diagram How to Organize Your Teaching: Improving Students' Memory and Understanding

Handout #2: Visual Diagram: How to Organize Your Teaching



Say:

Watch this brief overview showing research-based strategies to improve students' memory, strengthen problem solving skills, and build conceptual understanding.

Discover the research in cognitive psychology that suggests several ways teachers can organize instruction to improve their students' learning.

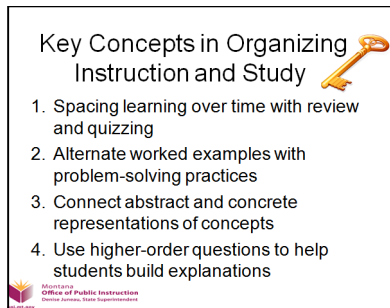
During this video, you need to think about "What impact on student learning can an organized or disorganized teaching environment have?"

Start Video:

After viewing the video: Have the students get with their three o'clock partner and do a two minute discussion on the impact organized or disorganized has on the learning environment. (2:00 min)

Media needed: *How to Organize Your Teaching* Multimedia Overview (4:33 min)

Handout: None



Say: Today we will be looking at these four key concepts related to the organization of teaching.

1. Spacing learning over time with review and quizzing
2. Alternate worked examples with problem-solving practices
3. Connect abstract and concrete representations of concepts
4. Use higher-order questions to help students build explanations

Media: None

Handout: None



Say:

Watch this interview of Dr. Pashler as he describes how research in cognitive psychology can help us understand and address common problems in teaching and learning. He gives an overview of four research-based practices, discusses how they might be used in schools, and provides implications for professional development.

As you watch, recall a student or teaching situation when you feel one of these concepts may have benefitted. Write down your thoughts during the video.

Start Video:

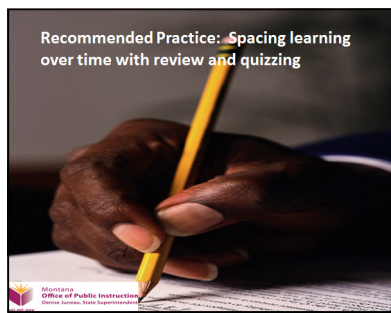
After viewing the video: Say: Share your thoughts for one minute with a partner sitting on your right. I will tell you when to switch. (2:00 min)

Media: Expert Interview: Key Concepts in Organizing Instruction and Study (7:45 min)

Materials: Paper/ Pencil

Handout: None



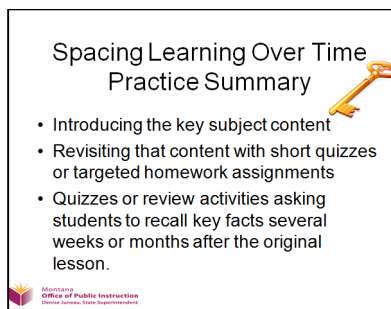


Say: The first recommended practice in the *IES* Practice Guide is "Spacing learning over time with review and quizzing".

There are four recommended practices in this module.

Media: None

Handout: None



Say:

We will read this slide together using the engagement strategy Cloze Reading. How this is done is I will read, when I pause you read the next word. I will then continue reading and whenever I stop, you read the next word.

Ready? (*Start Cloze Reading*)

1. Introducing the key **subject** content
2. Revisiting that content with short **quizzes** or targeted **homework** assignments
3. Quizzes or review **activities** asking students to recall key **facts** several weeks or **months** after the original **lesson**.

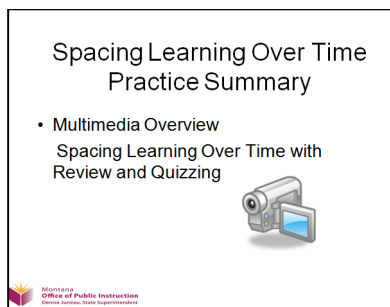
Say: A key aspect of effective teaching and learning is helping students retain information over the course of the school year and beyond.

Research has shown that exposing students to key concepts and facts on at least two occasions, separated by several weeks to several months, greatly reduces the rate at which information is forgotten.

This is accomplished by re-exposing students to course material after its introduction and by reviewing material with short quizzes, review games, targeted homework assignments, and exams. (2:00 min)

Media: None

Handout: None



Say:

- Research studies have found that spacing learning over time can improve students' retention of important course content.
- Key features of spacing learning over time include: introducing the key content, revisiting that content with short quizzes or targeted homework assignments, and quizzes or review activities asking students to recall key facts several weeks or months after the original lesson.

(Distribute the handout #3 and give time to read the bulleted questions before the video. (1 min)  
You will be discussing the questions on this handout during slide #22.)

(Distribute the handout #4 – pacing chart example to be discussed at end of video)

Say: View this multimedia overview to learn about how spacing the review of key concepts over weeks and months and using quizzes can improve students' memory.

As you watch the video, think about your schools curriculum, lesson planning, and pacing charts. Think about how you can incorporate review and quizzing into your pacing charts. A pacing chart is a calendar to plan the coverage of curriculum material. Example, a history book is divided into chapters and you place the chapters onto a pacing chart for the year so that you have time to finish the book. This allows a teacher or grade level team of teachers to do long range planning. A team may want to make sure all classes are on the same chapter to allow comparison of test questions or use of auxiliary materials.

Start Video

Say: Find the person with whom you made your six o'clock appointment.

Discuss the use of a pacing chart to enhance Spacing Learning over Time. Share with them your thoughts and ideas. Share with each other for three minutes. (Signal to go back to seats after 3 minutes) (3:00 min)

Say: Would anyone like to share an idea they or their partner had with the whole group? (2:00 min)

Media: Multimedia Overview

Spacing Learning Over Time With Review and Quizzing (4:49 min)



Handout #3: Learning Together about Spacing Learning Over Time

Handout #4: Pacing Chart Example – (Developed by R. Arntson)

Spacing Learning Over Time  
Learn What Works

LEARN:

- Expert Interview “Key Concepts in Spacing Learning Over Time”
- Mark McDaniel, Ph.D.  
Washington Univ., St. Louis



Say:

- “Spacing learning over time” means re-exposing students to material over the course of weeks and months to mitigate the problem of forgetting.
- Examples are provided to illustrate spacing learning and its effects.
- Suggested timeframes are offered for spacing learning.

“As you watch, listen for what experts consider to be the ideal timeframe for spacing learning over time.” Think about the questions from the previous handout #4. Make notes on the handout for the bulleted questions.

Start video:

After viewing video say, “Turn to your left hand partner and compare to see if you found the ideal time.” (1 minute)

Media: Expert Interview Key Concepts in Spacing Learning Over Time (6:21)

Handout: None

Spacing Learning Over Time  
Learn What Works-  
Key Concept

1. Use quizzes and fun games for retrieval practice to reduce forgetting.



Say:

The next five slides will show the key teaching concepts of spacing learning over time.  
Read the Slide and give a thumbs up when you finish.

Over the course of weeks or months, use ungraded quizzes and fun games so students practice retrieval of key content.

Quizzes and review activities not only enhance learning, they also reduce the rate at which students forget information.

Teachers should give students closed-book quizzes and create games that require students to recall important concepts from memory.

By building in these recall activities after the introductory lesson, teachers will increase the likelihood that students will remember the content on the final assessment.

Media: None

Handout: None

Spacing Learning Over Time  
Learn What Works-  
Key Concept

2. Teach students how to test and assess their own knowledge and focus their study strategies accordingly.



*Say:*

Read the Slide and give a thumbs up when you finish.

In addition to planning class activities and homework sets, teachers should instruct students on strategies for studying course material.

Teachers can use test and review activities in a way that helps students differentiate which content requires further study.

By providing immediate feedback on student responses, teachers can help students realize the content they have not yet mastered for the purpose of tailoring future study efforts.

Media: None

Handout: None

Spacing Learning Over Time  
Learn What Works-  
Key Concept

3. Use technology to provide quick-response quizzes.



*Say:*

Read the Slide and give a thumbs up when you finish.

Using technology can be helpful for creating short-answer quizzes that provide opportunities for students to practice recalling important information.

Existing web-based tools help teachers to quickly create quizzes by plugging their specific course content into an existing template.

Teachers can share resources to support implementation of more frequent review and quizzing.

Media: None

Handout: None

Spacing Learning Over Time  
Learn What Works-  
Key Concept

4. Plan for important content to be revisited and reviewed over time.



*Say:*

Read the Slide and give a thumbs up when you finish.

Curriculum coaches and administrators can provide teachers with professional development on how to plan for important content to be revisited and reviewed over time.

Teachers need to make deliberate decisions about how to structure class time and homework assignments to space the review of content over time.

Instead of waiting to go over key content right before the final assessment, teachers should carefully build in review activities throughout the course of a unit or quarter.

Administrators can provide time for teachers to discuss and plan how important curriculum content will be reviewed several days, weeks, or even months after initially introducing the material in class.

Media: None

Handout: None



Spacing Learning Over Time  
Learn What Works-  
Key Concept

5. Provide common planning time for teachers to revise grading systems that capture review and students' mastery of skills over time rather than a student's performance on a single assessment.



*Say:*

Read the Slide and give a thumbs up when you finish.

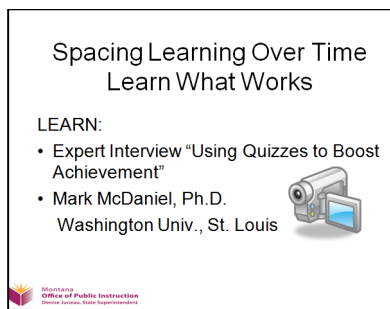
Supporting a curriculum that incorporates strategic and periodic review involves adjustments to assessment systems.

As teachers create multiple opportunities for students to revisit certain concepts over the course of the year, they might also need to incorporate grading policies that reflect a student's ability to retain material over time, rather than a single assessment at a single point in time.

Teachers should meet in teams to discuss how they can modify their current grading systems to account for more frequent review-based assignments.

Media: None

Handout: None



Say:

- Short, frequent, ungraded quizzes are useful tools for promoting memory and retention over time.
- Quizzes can be seen as tools for learning, not just assessment.
- In many courses there is a lot of factual material to be learned; quizzing can help facilitate this.
- Quizzing can be fun for students and is relatively easy to implement.

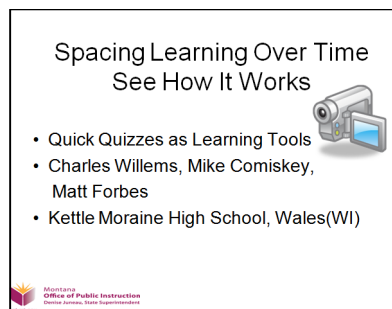
Say, "You will be getting into small groups after the video. Listen and be ready to share how you could use quizzes as a learning tool to supplement your current practices." Write down ideas you have on a paper during the video.

- Start Video

After video say, "Get into groups of three or four sitting around you and brainstorm quiz types and ways you could use quizzes." (i.e.. Multiple choice, short answer, online, flashcard, class game, paired work, etc.) (5:00 min)

Media: Expert Interview "Using Quizzes to Boost Achievement" (6:18)

Handout: None



*Preparation: Distribute handout #5 and #6*

Say:

This slideshow describes how three different math teachers use quizzes as quick activities to provide immediate feedback about concepts that need more instruction.

As you view the slideshow think about one subject you teach and what topics are important to review. Think about how you could use those topics to recognize student areas of strengths and weaknesses.

Start slideshow: (There are 6 slides without audio.)

Please read each slide and give a thumbs up when you finish so we can advance to the next slide.

Say: View the sample material handout #5, *Screenshots of Grade Reports*, to see how one teacher organizes student quiz scores by review topics.

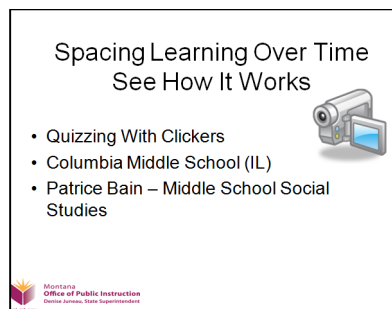
Read the handout #6 to see how one teacher organizes student scores in reading. (5 min)

Do: Find your clock and get with your 9 o'clock appointment. Share your ideas about how you could use those topics to recognize student areas of strengths and weaknesses for three minutes. (3 minutes)

Media: Quick Quizzes as Learning Tools (6:45 min)  
Kettle Moraine High School (WI)

Handout #5: Screenshots of Grade Reports Tracking Daily Quiz Results By Topic

Handout #6: Progress Monitor Tracking Chart for Reading Words per minute by R. Arntson



*Preparation: Distribute handout #7*

Say:

- Middle school social studies teacher Patrice Bain explains how she uses "clickers" a remote control device to give short, ungraded quizzes to prompt student recall of key course material.
- Clickers are a useful technology that provide immediate, correct answer feedback, which is motivating to students, helps them identify gaps in their knowledge, and provides useful information to teachers about students' understanding.
- Frequent quizzing with clickers can lead to significant learning gains for students over time

Start Video:

Activity after video: **Think, Pair , Share**

I want you to **Think**: "As you watched the video, did you think about your access to clickers and /or a possible way you could use them if this is a teaching method looks inviting? If you already have clickers, share how you use them or plan to use them."

Now, **pair** with your neighbor to share those ways to use them if this is a teaching method that looks inviting. (*Allow 2-3 min.*)

**Think**: How could you sell the idea of clickers to a principal? Did you think about your access to clickers and /or a possible way you could obtain them if this is a teaching method that looks inviting? i.e., funding methods.

**Pair** with the same neighbor to brain storm ideas with a partner. (*Allow 2-3 min.*)

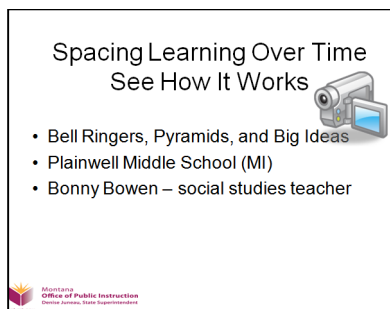
Let's **share** what you discussed with your partners. Share your ideas with the group orally or on a piece of chart paper. (3:00 min)

- View the sample material, *Screenshot of Interactive Whiteboard*, which displays the students' answers on the quizzes.
- Read the first and second page and look up when finished.
- Discuss the benefits of the quiz information from the chart. Analyze the benefits of immediate feedback to the teacher and the student. (i.e.. Reduce test anxiety, reteaching moments, improve material retention) (4:00 min)

Media: Audio Interviews: Quizzing With Clickers Patrice Bain - (5:50 min)

Material: chart paper, markers

Handout #7 Screenshot of Interactive Whiteboard Pre-test With Summary of Student Answers



Say:

- Bell ringers, or daily quizzes, are quick ways to review topics and provide students with immediate feedback.
- A structured review of “big ideas” in a unit helps students identify what they know and don’t know by requiring them to compare what they can recall on their own to what’s covered in the textbook.
- Vocabulary games that require students to recall definitions quickly are useful to identify concepts that need more instruction or practice.

Now watch Social Studies teacher Bonny Bowen describe how she uses three types of quiz activities to help students master and retain key course material.

As you watch the video, write down on a sticky note one current quiz activity you have in practice that may or may not have been mentioned in the video. It can be a teacher directed or student directed activity.

Start video

Do: After the video, everyone get up, stretch you legs and put your sticky notes on a piece of chart paper or on the white board. (2 min)

Say, “I will now read your sticky notes to share more ideas. If anyone wants to elaborate, feel free to raise your hand and you can expand upon your idea.”

(4 minutes)

Media: Bell Ringers, Pyramids, and Big Ideas (6:29)

Materials: Sticky Notes, Chart Paper or white board

Handout: None

### Spacing Learning Over Time Do What Works

- Learning Together About Spacing Learning Over Time
- Description- A Tool that can be used to convene a school in-service session for teachers to learn why and how to space learning over time.



*Preparation: Be familiar with Lesson Planning: Learning Together About Spacing Learning Over Time. You have watched the videos for this activity on the previous slides, #11, #12, and #21. Familiarize yourself with the handout #3 and use the activities on the handout for the group.*

Say: This activity is developed for curriculum coordinators, who are encouraged to use this tool to provide in-service training to deepen teachers understanding of spacing content throughout the school year.

Now refer back to handout #3. Get into groups of four (4) and discuss the bulleted questions posed. (5 min)

Stay in your group of four.

In the interview by Dr. McDaniel, he gives examples of how to space materials. Think of an important topic or concept you teach only once that you could space over the course of weeks or months. Discuss how you might restructure your curriculum planning to do so. Could a pacing chart help? (3 min)

Now in your group work on the included table referring to the interview about Bell Ringers, Pyramids and Big Ideas. Brainstorm ways in which you can review activities to revisit key concepts or ideas and additional strategies you might implement. (5 min)

Materials: Laptop and Projector

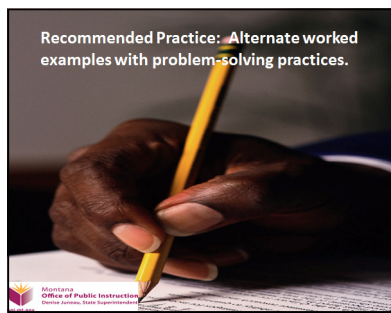
Handout #3: Learning Together about Spacing Learning Over Time  
(Tools & Templates)

Media: (previously viewed)

*Spacing Learning Over Time With Review and Quizzing.* Watch this multimedia overview to understand how spacing learning over time promotes retention. (4:49) On slide #11

*Key Concepts in Spacing Learning Over Time.* Watch this expert interview to learn how spacing and revisiting key course material promotes retention. (6:21) On slide #12

*Bell Ringers, Pyramids, and Big Ideas.* Watch this multimedia presentation to understand how one teacher uses review in her classroom. (6:29) On slide #21



Say: The 2<sup>nd</sup> recommended practice in the IES Practice Guide is alternating worked examples with problem-solving practices.

Media: None  
Handout: None

Alternate Worked Examples  
with problem-solving practice  
Practice Summary

- By providing a worked example before each new problem to solve, students are given access to better problem-solving strategies and can develop their own strategies more effectively.



Say:

We will read this slide together using the engagement strategy Cloze Reading. How this is done is I will read, when I pause you read the next word. I will then continue reading and whenever I stop, you read the next word.

Ready? (*Start Cloze Reading*)

By providing a worked **example** before each new problem to **solve**, students are given access to better **problem-solving** strategies and can develop their own strategies more **effectively**.

Say:

Students learn more when worked examples, or solved problems, are alternated with problems to be solved.

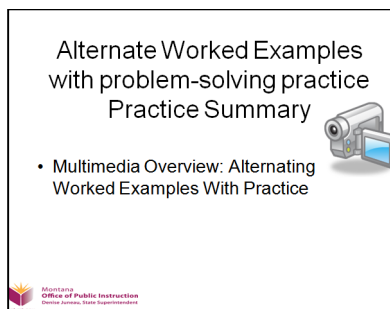
Worked examples can be provided for every other problem in a homework assignment or teachers can provide worked examples by thinking aloud with the whole class, assigning a similar problem, then doing another think aloud, followed by more practice.

Students benefit from this approach, learn effective problem-solving strategies, transfer these strategies more easily, and, ultimately, solve problems more quickly. (3 min)

Media: None

Handout: None





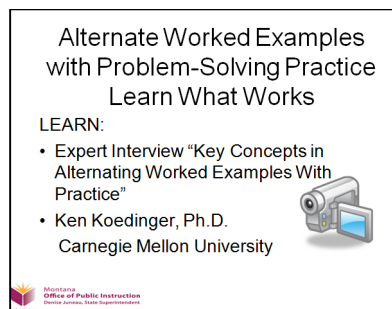
Say:

- Research studies have found that giving students examples of worked out solutions before each new problem is much more effective than simply providing a few examples followed by a series of problems.
- Students are often overconfident about what they think they understand. Providing worked out solutions can break this “illusion of knowing.”
- By providing a worked example before each new problem to solve, students are given access to better problem-solving strategies and can develop their own strategies more effectively.
- Before the overview video say: “Watch to find out what it means to alternate worked examples with practice.”
- Start video

Say: Get with your left side neighbor and discuss what it means to alternate worked examples with practice. (2 min)

Media: DWW Alternating Worked Example with Practice Multimedia Overview (3:53 min)

Handout: None



Before the Video Say:

"Listen to Dr. Ken Koedinger talk about how alternating examples with practice improves students' problem-solving strategies."

Start Video

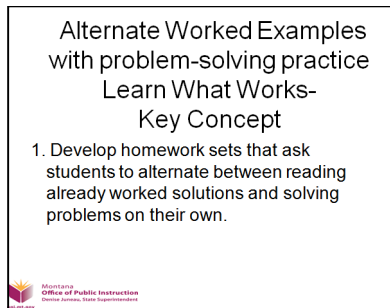
After the video say, "Get with your twelve o'clock appointment and discuss for three minutes why alternating examples with practice is more effective than offering an example or two and a set of problems to practice.

Also, at what points in your curriculum could this practice be successful?" (3 min)

Media: Expert Interview "Key Concepts in Alternating Worked Examples With Practice"

Ken Koedinger, Ph.D. (5:30 min) Carnegie Mellon University

Handout: None



Say: The following four slides show the key concepts of alternating worked examples with problem solving practice.

Read the first slide and give a thumbs up when you finish.

After everyone is finished:

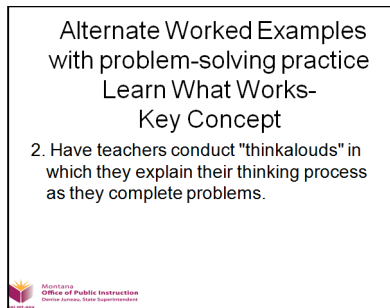
Say: Students learn more deeply and more easily when solved examples are interspersed among the practice problems they are asked to solve on their own.

Instead of providing an assignment that asks students to complete a list of problems after seeing only one example, teachers can work together in teams to develop more effective homework sets that alternate between worked examples and practice problems.

Have teachers conduct "thinkalouds" in which they explain their thinking process as they complete problems.

Media: None

Handout: None



Say:

Read the second slide and give a thumbs up when you finish.

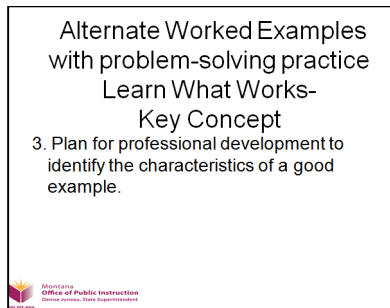
(After everyone is finished:)

Say: Teachers can use think-alouds to provide clear examples for students while also explicitly teaching the key steps and strategies students need to handle similar assignments on their own.

Teachers need to practice how they will explain their thought processes in front of the class for each step of the problem they are demonstrating.

Media: None

Handout: None



Say:

Read the third slide and give a thumbs up when you finish.

(After everyone is finished:)

Say: An effective worked solution breaks down a problem into important steps and strategies.

Teachers should also vary the form of the worked examples (e.g., changing both the values included in the problem and the formats) in order to give students practice in identifying the underlying principles and commonalities across problems.

Professional development can help teachers create assignments that maximize the important components of worked examples.

Media: None

Handout: None

Alternate Worked Examples  
with problem-solving practice  
Learn What Works-  
Key Concept

4. Consider incorporating online tutorials that assist students.



Say:

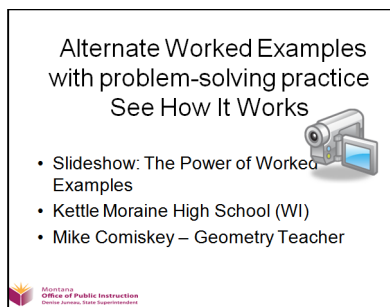
Read the fourth slide and give a thumbs up when you finish.

(After everyone is finished:)

Say: Teachers can locate and use web-based tools that provide step-by-step hints, strategies, and worked examples for students trying to solve problems. These tools can serve as a resource to supplement teacher-developed homework sets that alternate worked examples.

Media: None

Handout: None



Say:

- A math teacher describes how alternating between worked examples and student practice allows him to efficiently correct misconceptions and target particular areas of struggle.
- It is important to walk through the key steps of a process in explaining a worked example to students.
- Teachers should use a “fading” approach for worked examples to gradually increase the skill level and confidence that students have to solve problems.
- Including variation in the types of practice problems given to students helps them learn new concepts better.

Watch as geometry teacher Mike Comiskey alternates between modeling worked examples and giving his students problem-solving practice and fades his support over time.

Start Slideshow

Please read each slide and give a thumbs up when you finish so we can advance to the next slide.

Media: Slideshow: The Power of Worked Examples (5 slides)

Kettle Moraine High School (WI) Mike Comiskey – Geometry Teacher

Handout: None

Alternate Worked Examples  
with problem-solving practice  
See/Do How It Works

- Student Handout: Order of Operations Homework with Worked Examples
- Carnegie Mellon University
- Julie Booth and Ken Koedinger



Preparation: Distribute the handout #8.

Say:

This is an example of how homework sets can alternate worked out problems with problems for students to solve.

This set of problems focuses on order of operations. Correct answers are offered as ways to help students think about problem solving strategies and provide an opportunity to explain their thinking.

Seeing examples and having opportunities to explain or reflect on the strategies required can give students valuable insights into how to approach problems of a similar type.

Using the handout, work through the problems. Share your answers with a person next to you. Did the correct example help you solve the next problem? (5 min)

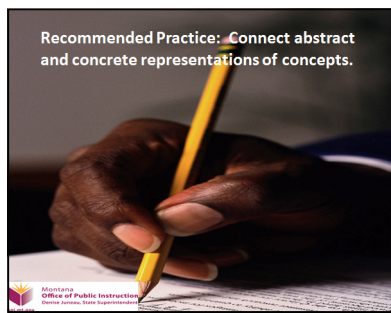
Do: Whole group discussion – ask the following questions and discuss.

1. How does providing worked-out solutions address the issues of the “illusion of knowing,’ or student’ overconfidence in what they think they understand?
2. What does alternating examples with practice look like in the classroom?
3. How could this practice be incorporated into other areas besides math? (6 min)

Media: None

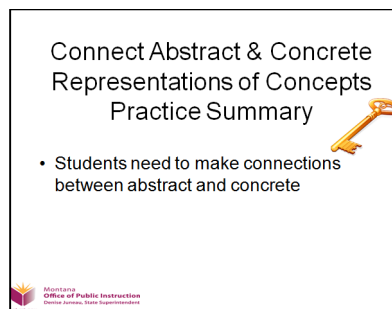
Handout #8: Student Handout: Order of Operations Homework with Worked Examples





Say: The 3<sup>rd</sup> recommended practice in the IES Practice Guide is to connect abstract and concrete representations of concepts.

Media: None  
Handout: None



Say:

We will read this slide together using the engagement strategy Cloze Reading. How this is done is I will read, when I pause you read the next word. I will then continue reading and whenever I stop, you read the next word.

Ready? (*Start Cloze Reading*)

Students need to **make** connections between **abstract** and **concrete**.

Say:

Connecting abstract ideas with concrete contexts can help students understand challenging topics and learn to transfer their understanding to new situations.

There are many ways teachers can connect the abstract and the concrete including using stories, simulations, hands-on activities, visual representations, and real-world problem solving.

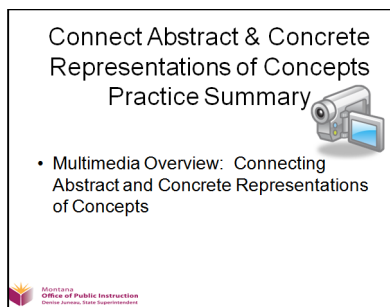
Teaching a new concept in purely abstract terms can make it difficult for students to fully understand what is being taught.

On the other hand, teaching a new concept in exclusively concrete terms can limit a student's ability to recognize key concepts or understand how to apply the concepts when faced with a new problem.

Connecting abstract and concrete representations, and clearly highlighting the similarities and differences, can help students master the content being taught and develop better problem-solving strategies.

Media: None

Handout: None



*Preparation: Distribute handout #9.*

Say:

- Research studies have found that by illustrating abstract concepts with concrete representations and helping students see the connections between them, teachers improve the likelihood that students will master what is being taught.
- Teaching a new concept in purely abstract terms can make it difficult for students to fully understand what is being taught. On the other hand, teaching a new concept in exclusively concrete terms can limit a student's ability to understand how to apply the concepts to other situations.
- Several ideas for approaches to making connections between abstract and concrete representations are described.

Read the handout and refer to the discussion questions before we start the video. We will be watching two videos to reflect on these questions.

View this multimedia overview to learn about how connecting abstract ideas with concrete situations can help students understand difficult concepts and transfer their knowledge to new situations.

Start Video


Media: Multimedia Overview: Connecting Abstract and Concrete Representations of Concepts (5:44 min)

Handout #9: Learning Together About Connecting Abstract and Concrete Representations of Concepts (Tools & Templates)

Connect Abstract & Concrete  
Representations of Concepts  
Learn What Works

LEARN:

- Expert Interview “Using Concrete Situations to Introduce Content”
- Brian A. Bottge, Ed.D.
- University of Kentucky



Montana  
Office of Public Instruction  
Denise Juneau, State Superintendent

Say:

- Dr. Bottge explains how teachers can introduce content with real-world problem scenarios and make connections with abstract concepts.
- Students need mental models to understand complex ideas.
- Students need a firm foundation in concrete experiences before they move to the abstract.
- Sophisticated concepts can be learned from hands-on and real-life problem solving.

Listen for some examples of the ways in which teachers can help their students see the relevant and shared components of abstract and concrete representations.

Start Video

After the video say, “ Share with your three o'clock appointment one of the examples Dr. Bottge used to demonstrate concrete connections to form mental models of abstract ideas.

What are some strengths to using only concrete or abstract representations? Weaknesses?  
(Think/Pair/Share for three minutes.) (3:00 min)

Handout: None

Media: Using Concrete Situations to Introduce Content (5:42)

Connect Abstract & Concrete  
Representations of Concepts  
Learn What Works-  
Key Concept

1. Identify the challenging concepts in your discipline and how you might demonstrate these concepts in concrete contexts



Say: The next four slides will show the key teaching concepts of connecting abstract and concrete representations of concepts.

Read the first slide and give an A-OK sign when you finish.

Say: There are four key concepts for connecting abstract and concrete concepts. Teachers should anticipate the abstract concepts that students may struggle with and then plan ways to bring in concrete representations (e.g., symbols, graphs, pictures, objects, movie clips, etc.) that facilitate student learning. (2 min)

Media: None

Handout: None

Connect Abstract & Concrete  
Representations of Concepts  
Learn What Works-  
Key Concept

2. Use graphic representations with verbal descriptions that illustrate key processes and procedures.



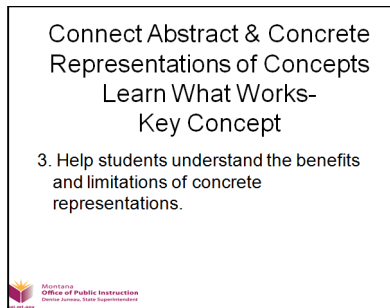
Say:

Read the second slide and give an A-OK sign when you finish.

Say: By pairing visuals with verbal descriptions, teachers can illustrate concepts more effectively than with a text or verbal explanation alone. A more abstract picture can sometimes illustrate a key idea better than a more realistic, but potentially distracting, graphic.

Media: None

Handout: None



Say:

Read the third slide and give an A-OK sign when you finish.

Say: Being explicit about how a concrete representation does and doesn't connect with an abstract idea helps students to use the concept appropriately across a range of contexts. I

It is important to draw attention to the components of the concrete representation that are relevant to the abstract concept so that students gain an accurate understanding of the core concept and are aware of the limitations of the metaphor or symbol being used.

Media: None

Handout: None

Connect Abstract & Concrete  
Representations of Concepts  
Learn What Works-  
Key Concept

4. Provide teachers with professional development in creating lessons that situate challenging course material in real-world problem scenarios.



Say:

Read the fourth slide and give an A-OK sign when you finish.

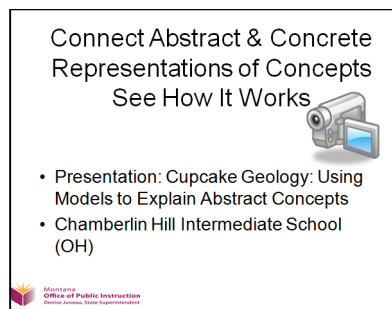
Say: It can be difficult to create lessons that use real-world problem scenarios and also directly connect to academic content in ways that deepen students' understanding.

Provide opportunities for teachers to discuss examples and also learn how they can use demonstrations, experiments, or simulations to connect abstract concepts to concrete experiences.

Media: None

Handout: None





*Preparation: Distribute handout #10.*

Say: We will be watching a series of videos in different content areas to give you ideas of connecting abstract and concrete. While you are watching these videos, think how you could use one or more of the ideas shown. At the end of the series of videos, we will share our ideas with the group.

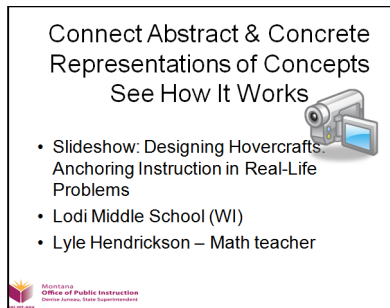
- In the first video, a 5th-grade teacher describes using models and hands-on activities to help students understand complex earth science concepts.
- Teachers need to help students learn to identify both the strengths and limitations of models—where the abstract and concrete representations have shared and different components.
- In this multimedia presentation, fifth-grade teacher Deb Wickerham describes how she uses models and hands-on activities to help elementary students understand complex earth science concepts.

Start Video:

Read through the related sample material, *Lesson Plan: Cupcake Geology*. (3 min)

Media: Presentation: Cupcake Geology: Using Models to Explain Abstract Concepts (4:58 min)

Handout #10: Lesson Plan: Cupcake Geology



Say:

- In the second slideshow, a 7th-grade math teacher's demonstration of a hovercraft activity shows how math concepts can motivate real-life problem solving.
- With instruction anchored in real problems, students have the opportunity to understand the applications of the mathematical tools, skills, and strategies they are learning.

Start slideshow (7 slides)

Please read each slide and give a thumbs up when you finish so we can advance to the next slide.

Media: Slideshow: Designing Hovercrafts: Anchoring Instruction in Real-Life Problems (7 slides)  
Lodi Middle School (WI) Lyle Hendrickson – Math teacher  
Handout: None

Connect Abstract & Concrete  
Representations of Concepts  
See How It Works



- Interview and Classroom Video:  
Demonstrating Thermal Layering
- Starr Elementary School, Plainwell (MI)
- Tasia Stamos, Fifth Grade Teacher



Say:

•In the third video, a science teacher uses hands-on lab experiments and demonstrations to help her elementary students understand abstract concepts in science.

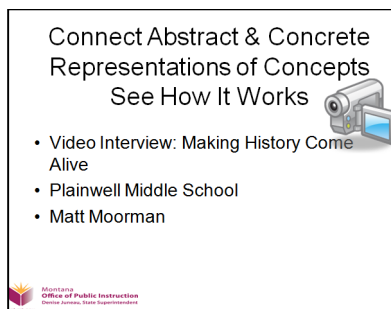
•Using an aquarium and food coloring, science teacher Tasia Stamos re-creates the layers of warm and cool water in a summer lake to help her students visualize the effects of thermal layering.

Start Video

Media: Presentation Interview and Classroom Video: Demonstrating Thermal Layering

(7:53 min)

Handout: None



Say:

- The last presentation shows a teacher using a history curriculum that incorporates pictures, graphic organizers, and visual metaphors to help students understand abstract ideas.
- Visuals can be a springboard for discussion, help present complex relationships, or put learning in meaningful context.
- Incorporating visuals in instruction can help all students learn key concepts, but it is also specifically supportive of students with different learning styles.
- Social studies teacher and curriculum trainer Matt Moorman explains how to help students understand abstract ideas by using visual techniques, including graphic organizers and visual metaphors.

Start Video

Do: After the presentations, discuss the use of visuals to help this concept enhance the learning process. Share your opinion and ideas with a partner on your left. (2 min)

Media: Video Interview: Making History Come Alive (4:13 min)

Handout: None

Connect Abstract & Concrete  
Representations of Concepts  
Do What Works

- Learning Together About Connecting Abstract and Concrete Representations of Concepts



*Preparation: Be familiar with the lesson planning, "Learning Together About connecting Abstract and Concrete Representations of Concepts." Refer to Handout #9. Videos have been previously viewed on slides #35 & #36.*

Say: Trainers, coaches, and expert teachers are encouraged to use this tool to provide in-service training on strategies for connecting abstract and concrete representations of concepts. During this session, teachers will work in the larger group and in small groups to deepen their understanding of instructional strategies and practices.

Do: large group discussion (6 min)

Say:

1. How does making connections between abstract and concrete concepts impact student learning?
2. What are some examples of the ways in which teachers can help their students see the relevant and shared components of abstract and concrete representations?
3. What are some of the drawbacks in using only concrete or only abstract representations?
4. In his interview, Dr. Bottge mentions that concrete connections can help students form mental models of abstract ideas. How would you define "mental models"? What are some of the ways you can help your students form mental models of difficult concepts?
5. In his interview, Dr. Bottge demonstrates how fractions can be taught using paper strips. What feature of this activity might support students' learning about fractions?

Discuss the benefits and limitations of the three approaches mentioned in the multimedia presentations: real-life contexts, hands-on learning, and multiple representations (including visuals). In small groups, brainstorm some ways, large and small, they already help their students to transfer their learning to new contexts. (15 min)

Refer to Handout #9:

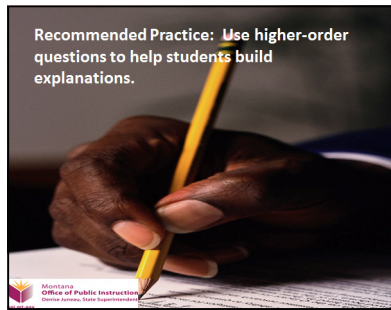
Learning Together About Connecting Abstract and Concrete Representations of Concepts (Tools & Templates)

Materials: Laptop and projector

Media: (previously viewed)

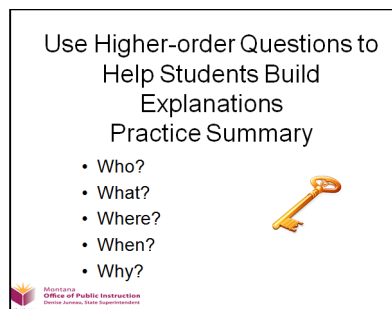
*#35 Connecting Abstract and Concrete Representations of Concepts.* Watch this multimedia overview to learn about how making connections between abstract and concrete representations improves student learning. (5:44)

*#36 Using Concrete Situations to Introduce Content.* Watch this expert interview with Dr. Brian A. Bottge to learn about the benefits of introducing content through concrete experiences, situations, and problem scenarios. (5:42)



Say: The 4<sup>th</sup> recommended practice in the IES Practice Guide is to Use higher-order questions to help students build explanations.

Media: None  
Handout: None



Say: Across subject areas, when teachers ask higher-order questions and provide opportunities for students to develop deep explanations, learning is enhanced.

Higher-order questions often start with question stems like: why, what caused, how did it occur, what if, how do they compare, or what is the evidence?

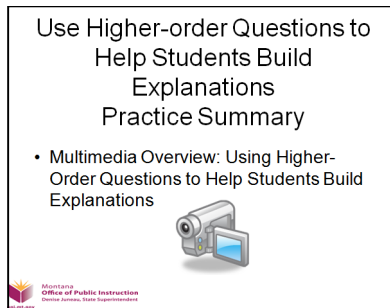
When teachers ask higher-order questions and encourage explanations, they are helping their students to develop important critical thinking skills. There are a number of ways teachers can encourage their students to develop explanations.

During class discussions, homework assignments, or while reading, teachers can encourage students to explain their thinking out loud or in writing.

Units of study that begin with a provocative question, or set of questions, will also encourage students to develop explanations and deepen their understanding of key content.

Media: None

Handout: None



*Preparation: Distribute handout #11.*

Say:

- Higher-order questions are contrasted with fact-based questions.
- Teachers can pose questions that promote reasoning about principles, theories, and arguments.
- Teachers can create rich contexts for deep explanations to be developed in.
- Having students verbalize or write out their responses helps them clarify their thinking.

Read the handout and refer to the discussion questions before we start the video. We will be watching two videos to reflect on these questions. (2 min)

As you watch the overview video listen for the definition of a higher order question.

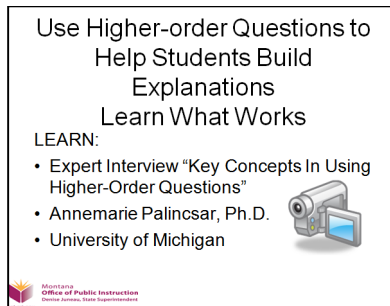
Start video

Large group Discussion: What is a higher-order question? (2 min)

Media: Multimedia Overview: Using Higher-Order Questions to Help Students Build Explanations (5:57 min)

Handout #11: Learning Together About Using Higher-Order Questions to Help Students Build Explanations





Say:

- Dr. Palincsar discusses the importance of asking higher-order questions and how to build opportunities for deep explanations in the classroom.
- Teachers can support the practice of building explanations with question starters and participation structures that require students to take a stance.
- Building explanations helps students identify gaps in their understanding and compare their thinking with others.
- Listen as Dr. Annemarie Palincsar discusses the importance of asking higher-order questions and how to build opportunities for deep explanations in the classroom.

As you watch the video listen for how a teacher’s own knowledge of a topic is important.

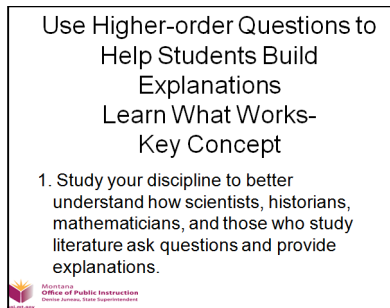
Start Video

After viewing video: Get with your six o’clock appointment and share how a teacher’s knowledge or lack of knowledge, can support or hinder a student’s ability to work towards building explanations on a topic. (3:00 min)

Large group: Where in education does a teacher need to become specialized in a subject? (3:00 min)

Media: Expert Interview “Key Concepts In Using Higher-Order Questions” (6:37 min)

Handout: None



Say: The next four slides will show the use of higher-order questions to help students build explanations.

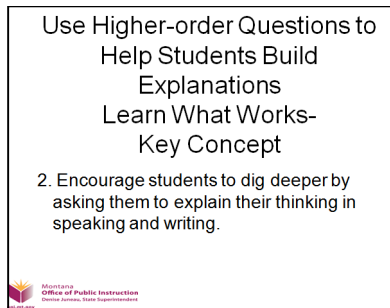
Read the first slide and give an A-OK sign when you finish.

Say: We will explore the four key concepts in using higher-order questions. First, in order to generate higher-order questions that get at the heart of a subject area, teachers must become familiar with the types of questions, important understandings, and sources of evidence that shape their particular discipline.

Teachers can also generate higher-order questions that challenge students' assumptions or misconceptions. (2:00 min)

Media: None

Handout: None



Say: Read the second slide and give an A-OK sign when you finish.

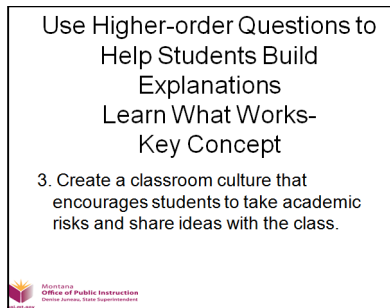
Say: Teachers should use questions that prompt students to think critically about course content as a way to deepen understanding about factual content.

Teachers should ask students to provide explanations for their understandings that go beyond repetition of material that has already been taught in discussions and written assignments.

Create a classroom culture that encourages students to take academic risks and share ideas with the class.

Media: None

Handout: None



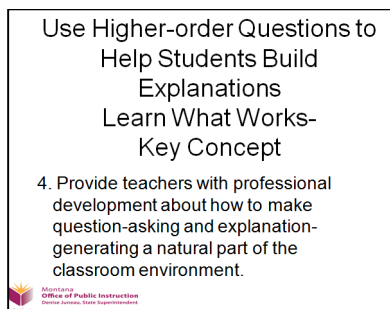
Say: Read the third slide and give an A-OK sign when you finish.

Say: Students are often reluctant to share their ideas beyond a one-word answer. Without a classroom culture that encourages academic risk-taking, students may limit their responses to simple, repetitive answers.

Teachers need to provide a supportive environment for students to share more in-depth and analytical thoughts in class discussions (e.g., allow sufficient wait time for responses, provide sentence starters to scaffold explanations, create norms and structures for respectful dialogue).

Media: None

Handout: None



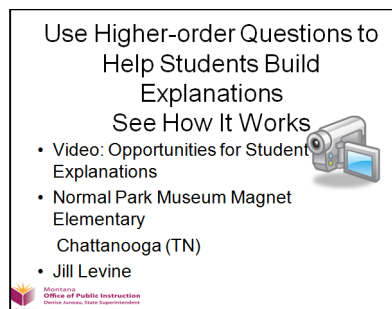
Say: Read the fourth slide and give an A-OK sign when you finish.

Say: Teachers should reflect on whether their classroom routines, activities, and learning environment are creating opportunities for students to develop deep explanations in response to higher-order questions on studied topics.

Teachers need time to learn effective questioning strategies and to examine students' responses in a professional development environment that values well-supported arguments and critical thinking.

Media: None

Handout: None



Say: We will be watching a series of videos in different content areas to give you ideas about using higher-order questions and discussing at the end of the series.

While you are watching these videos, think how you could use one or more of the ideas shown. At the end of the series of videos, we will share our ideas with the group.

Say:

- A principal describes how the culminating project of each curriculum unit involves the creation of museum exhibits to demonstrate student learning and understandings.
- Two students practice giving their explanations to demonstrate their understanding of a unit.
- On Exhibit Night, students give tours to visitors who come to the school, which is an opportunity for students to practice giving clear and accurate explanations to an audience.

As you watch the video think about how you could transfer this idea into your own classroom.



Start Video

Media Video: Opportunities for Student Explanations (4:01 min)  
Handout: None

Use Higher-order Questions to  
Help Students Build  
Explanations

See How It Works

- Video: Essential Questions: A Schoolwide Approach
- Normal Park Museum Magnet Elementary  
Chattanooga (TN)
- Jill Levine, Joyce Tatum

Say:

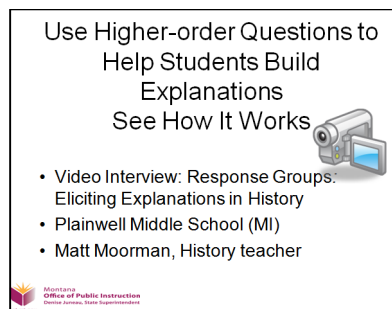
- Two school administrators describe how they support the use of higher-order questions through professional development that focuses on curriculum planning and effective instructional strategies.
  
- Grade-level modules are driven by questions and enduring understandings that anchor instruction.
  
- Starting in kindergarten, students are expected to provide rich explanations; teachers scaffold instruction so students engage in critical thinking.
  
- Open-ended questions and follow-up questions are important techniques for helping students develop understandings.
  
- As you watch the video, identify how essential questions are implemented.

Start Video

After the video: Hand out the Sample Essential Questions and work with your right hand partner to examine and analyze how one school turned enduring understandings into essential questions. (3:00 min)

Discuss as a whole group: Do you think this strategy will help students to have better understanding at the end of a unit? (3:00 min)

Media Video: Essential Questions: A Schoolwide Approach (5:18 min)  
Handout #12: Sample Essential Questions by Grade Level



Say:

- In the third video a history teacher describes using higher-order questions to engage students in critical thinking and to help students to remember and internalize the information they learn.
- Response Groups require students to work cooperatively to analyze, interpret, and discuss controversial topics.

Start Video

Preparation: Stopwatch

Say:

We will be using an engagement strategy called 30, 15, 5

Here is how we use this strategy:

Partner 1 speaks for 30 seconds, partner 2 speaks for 15 seconds, and then, lastly, partner 1 sums it up for 5 seconds.

Everyone please stand up and partner with someone you have not yet partnered with. Stand next to that person.

Partner 1 is the person who is tallest and Partner 2 is the shorter partner.

Now, when I say go, partner 1 summarizes the information on the video, when I say switch, partner 2 adds information, when I say sum it up, partner 1 summarizes the video.

Ready? Go! (2 min)

Media: Response Groups: Eliciting Explanations in History (3:00)

Handout: None



Use Higher-order Questions to  
Help Students Build  
Explanations  
Do What Works

- Sentence Starters for Generating Higher-Order Questions
- Help generate deeper explanations using this worksheet for starting student sentences



*Preparation: Be familiar with lesson planning, “Sentence Starters for Generating Higher Order Questions.”*

*Distribute handouts #13 and #14. They will be using handout #11 as reference material.*

*Get in groups of 4. Assign each group a grade level.*

Say: Teachers can use this sentence starter tool to develop questions that prompt critical thinking in a response or to plan specific discussions or unit questions. Teachers may extend this tool by developing sentence starters to support strong student responses.

In your group, refer to the sample essential questions handout #11. Your group will work with the grade level and unit title from this handout.

Your assignment is to develop two more enduring understandings for your topic. Then use the Sentence Starters, handout #13 and Bloom’s Taxonomy, handout #14 to develop two more essential questions for the topic.

Be prepared to share these with the large group. (5 min)

The person who is the youngest in your group will share your enduring understandings and essential questions with the entire group.

Do: Start with the Kindergarten group and advance upward.

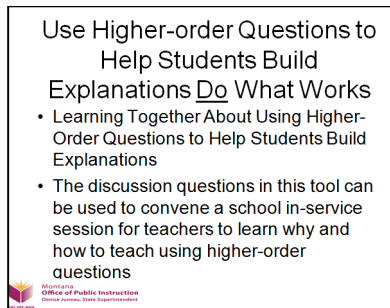
Say: Discuss the essential questions as a large group and give feedback on quality of the questions. Does it develop the deeper explanations to expand the student’s understanding of the topic? (10 min)

Handout #13: Sentence Starters for Generating Higher-Order Questions

Handout #14: Bloom’s Taxonomy Verbs <http://www.teachervision.com>

Refer to Handout #11

Media: None



*Preparation: Be familiar with the lesson planning, "Use Higher-order Questions to Help Students Build Explanations"*

*Refer to Handout #11.*

Say: Trainers, coaches, and expert teachers are encouraged to use this tool to provide in-service training on strategies for using higher-order questions to help students build explanations.

Do: Question #2 on handout #11.

Brainstorm in a group of 4, 'What can a teacher do to create a classroom environment that supports inquiry and explanation?'

-Be prepared to share the group's best ideas with the large group.

(The person who traveled the farthest in the group will present the ideas) (8 min)

Materials: Laptop and projector

Refer to Handout #11: Learning Together About Using Higher-Order Questions to Help Students Build Explanations

Media: (previously viewed)

*Using Higher-Order Questions to Help Students Build Explanations.* Watch this multimedia presentation to learn about how higher-order questions that prompt student explanations improve learning and comprehension. (6:40)

*Key Concepts in Using Higher-Order Questions.* Watch this expert interview with Dr. Annemarie Sullivan Palincsar to learn about how teachers can use higher-order questions to elicit student explanations. (6:34)

## How to Organize Your Teaching Teaching Strategies

### Wrap Up



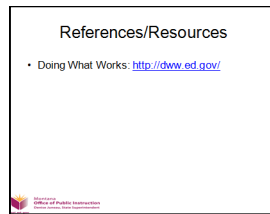
In conclusion of the module, 'How to Organize Your Teaching, Teaching Strategies', I hope you've gained an insight into successful teaching strategies that will engage students and increase student success in your class.

To gain feedback about the module, give a thumbs up, a thumbs down or a neutral thumb as I review the strategies.

Is it a strategy that you will use?

1. Spacing learning over Time
2. Alternate worked examples with problem-solving practice
3. Connect abstract and concrete representations of concepts
4. Using higher-order questions to help students build explanations

Thank you for your time and attention. Have a safe trip home. (3:00 min)



Say:

Much of the media and handouts for this training was made available from the website ***Doing What Works***

The Doing What Works website is a website dedicated to helping educators implement effective educational practices and includes practice guides developed by the U.S. Department of Education's Institute of Education Sciences.

No media

No handouts